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POTEN & PARTNERS, INC.

LIQUEFIED GAS SHIP SAFETY
Analysis of the Record: 1980 Supplement

May 1981

INTRODUCTION

In May 1980, we published a factual analysis of gas ship safety entitled Liquefied Gas Ship Safety: Analysis of the Record 1964-1979. This report updates the record through 1980.

As before, casualty data on gas ships have been compiled from reports published in Lloyd's List. The data originate in notifications by shipowners to insurance writers of potential damage claims. Although reporting practices vary among individual shipowners, it is believed that almost all incidents which result in serious damages or in hazards to life and property have been included in this report. Owners have every reason to report what might be major losses to their insurance companies.

A complete listing of reported casualties to gas ships (over 5,000 cubic meter carrying capacity) during 1980 is to be found in the Appendix to this report.

CASUALTY ANALYSIS

Overview

Casualties which are judged "serious" are those where there was some actual or potential threat to the cargo containment systems. Any spill or leakage of cargo creates a possibility of fire which could endanger nearby persons or property.

The three questions to ask about any incident are these:

- 1) Could the accident have resulted in cargo leakage; was there a risk of leakage?
- 2) Did some leakage of cargo in fact occur?
- 3) Did the spill ignite and cause fire damage?

The first question involves human judgement in identifying "serious incidents". The criteria used in this study have been to consider as "serious":

- 1) All incidents of fire or explosion occurring anywhere on a gas ship.
- 2) Incidents of hull damage resulting from groundings, collisions with another ship, contact with stationary objects, and being struck while moored. (Not included were incidents when the cargo tanks were empty and gas-freed, or filled with non-flammable cargo).
- 3) All incidents of cargo spill or leakage.

Data relating to the consequences of accidents are much less judgemental. Casualty records are quite clear as to whether cargo leakage occurred and whether a cargo fire occurred.

1980 Gas Ship Safety Record

The 1980 survey includes eight serious incidents where, in the judgement of Poten and Partners, Inc., some risk of cargo leakage and fire appeared to exist. The serious incidents and their consequences are summarized, for LNG ships and LPG ships separately, as follows:

Summary of serious incidents (LNG ships)

Type of Incident	Number of Incidents		Cargo Leakage	Cargo Fire
	1980	1964-80		
Collision while underway	0	1	0	0
Struck while moored	0	1	0	0
Contact with stationary object	1	1	0	0
Grounding	1 (b)	2	0	0
Explosion/fire on board	0	3	0	0
Spillage of cargo	0	1	1 (a)	0
Totals	2	9	1	0

- (a) The MOUSTAFA BEN BOULAID had an LNG spill of 15 minutes duration while discharging cargo at Ccve Point, Maryland on April 8, 1979. Leakage resulted from a construction defect in a safety valve. Damage was limited to deck fractures. There was no cargo tank damage. Repairs were subsequently made at the yard.
- (b) The LNG TAURUS grounded in heavy seas off the west coast of Japan on December 12, 1980, rupturing four ballast tanks. The cargo containment system, however, remained intact. On December 16, the vessel was refloated and towed to Tobata, Japan where the cargo was discharged. Repairs were effected at Nagasaki and the ship returned to service April 18, 1981.

Problems have arisen in recent years in the design of particular LNG containment systems. Three 125,000 cubic meter LNG carriers on order at Avondale Shipyard were rejected for LNG service after the initial ship failed gas-trials. Ships of the Gaz Transport design have required tank modifications to eliminate sloshing problems. It should be noted that no LNG ship is placed in LNG service until after it has passed rigorous tests on hull structure, cargo containment and vessel performance at the shipyard and during sea and gas trials. Industry vigilance in detecting and addressing potential ship design/construction flaws has helped to keep to a minimum the number of serious accidents to LNG ships while actually carrying an LNG cargo.

Summary of serious incidents (LPG Ships)

Type of Incident	Number of Incidents		Cargo Leakage	Cargo Fire
	1980	1964-80		
Collision while underway	0	10	0	0
Struck while moored	1	6	0	0
Contact with stationary object	0	4	0	0
Grounding	4	12	0	0
Explosion/fire on board	1	10	0	0
Spillage of cargo	0	1	1 (c)	0
Totals	6	43	1	0

- (c) The LAVOISIER suffered a cargo leak while discharging a butane cargo on March 23, 1967. A fracture in the safety valve may have been responsible. The spill did not ignite.

The general conclusion for 1980 is the same as for previous years. No instance has been found of a cargo spill resulting from hull or tank damage. Equally, there has been no case of cargo fire.

This factual history of marine accidents is offered as a contribution to the discussion of gas ship safety. In describing accidents which have occurred in the past, these records provide a guide to future problem-areas. History does not prove that a major accident cannot occur, only that it need not occur as long as adequate precautions are taken.

APPENDIX

REPORTED CASUALTIES TO LIQUEFIED GAS CARRIERS
OVER 5,000 CBM DURING 1980

This is a compilation of all reported casualties sustained by liquefied gas carriers larger than 5,000 cubic meters cargo capacity during the year 1980. The reports themselves have no official status and were not submitted to any governmental agency. In many cases, detailed information on the cause or consequence of a casualty was not available at the time a report was filed. The wording of the reports should not be construed as fixing blame or responsibility for any casualty, for such determination had not been made at the time of reporting.

Data were compiled on a total of 208 ships which sustained 28 casualties of all types. Unmanned barges were excluded.

<u>Cargo Tank Type</u>	<u>Number of Ships</u>	<u>Number of Casualties</u>
Insulated for LNG	56*	6
Refrigerated	113	20
Semi-refrigerated	39	2
Total	<u>208</u>	<u>28</u>

*Only 47 of these ships actually transported an LNG cargo during 1980. Eight ships were laid up, and one ship transported an LPG cargo.

REPORTED CASUALTIES TO LIQUEFIED GAS CARRIERS OVER 5,000 CBM

1980

Cargo Tank Type
 Insulated for LNG - I
 Refrigerated - R
 Semi-refrigerated - S

VESSEL NAME	CUBIC METERS	FLAG	OWNERS	YEAR BUILT
<u>AL BERRY</u>	76,700 (R)	Saudi	Arab Maritime Petroleum	1979
Nov. 1980 Hit bottom, grounded.	Grounded enroute from Ras Tanura at 132.7 km in Suez Canal, detaining 17 vessels behind. Refloated next day by Suez Canal Authority tugs.			
<u>ANTILLA CAPE</u>	29,540 (R)	Neth. Ant.	Nedlloyd Bulk B.V.	1968
April 1980 Generator failure	Nos. 2 and 3 generators failed in service due to piston breakage and cooling water failure. Reported in San Francisco. Actual date unknown. Seven cylinder heads replaced in No. 2 generator. Survey required for No. 3 after temporary repairs.			
<u>CORAL ISIS</u>	5,536 (S)	Neth. Ant.	United Gas Carriers	1976
July 1980 Heavy weather damage.	Heavy weather damage en route from U.S. Gulf to Geelong, July 4-6. High seas caused forecastle hood torn off and missing, chemical extinguisher hose torn from bolted seat and discharge cylinder thrown across deck, spar propeller securers buckled, no. 1 p/tank pressure gauge and sounding gauge pipes set aft, and miscellaneous damages. Permanent repairs were effected in Melbourne.			
Dec. 1980 Engine trouble.	Engine trouble en route from Terneuzen to Butzfleth, carrying cargo of propylene. Vessel anchored at Cuxhaven and then proceeded to Butzfleth Dec. 30 with the assistance of two tugs.			

VESSEL NAME	CUBIC METERS	FLAG	OWNERS	YEAR BUILT
<u>DISCARIA</u>	22,240 (R)	Liberian	Discaria Shipping	1969
Sept. 1980 Engine damage.	Machinery damage to emergency generator and alternator engines. First surveyed in Ras Tanura in Oct. Subsequent damages and repairs to units recurred through Nov. Vessel towed as "dead ship" to Bahrain for final repairs Nov. 10.			
<u>EL PASO HOWARD BOYD</u>	126,540 (I)	American	El Paso Marine	1979
June 1980 Hit bottom, grounded.	Grounded due to breaking adrift from dock at Hampton Roads. Diver examination on June 17 found no damage.			
<u>GAMBHIRA</u>	14,103 (R)	British	P & O Steamship	1969
April 1980 Compressor damage.	Cracked LPG compressor cylinder block reported on arrival Bombay. Cause of damage unknown.			
<u>GARBETA</u>	22,764 (R)	British	P & O Steamship	1975
March 25, 1980 Heavy weather damage.	Heavy weather damage repairs effected at Marseilles after voyage from Port de Bouc. Vessel sailed April 8, but returned three days later after discovery of further damage to double bottoms.			
<u>GAS AL BURGAN</u>	72,100 (R)	Kuwait	Kuwait Oil Tanker Co.	1979
July 1980 Shell damage.	Alleged shell damage s/side. Cause and date unknown. Three shell plates partly renewed. Repairs effected at La Ciotat in July.			

VESSEL NAME	CUBIC METERS	FLAG	OWNERS	YEAR BUILT
<u>GAZ ENTERPRISE</u>	70,900 (R)	British	British Petroleum	1977
March 1980 Pump damage.	As RAZI, Iranian flag, incurred damage to cargo pump of No. 3 port cargo tank while enroute from Ras Tanura. Survey revealed damage to vertical suction pipe assembly and transmission shaft, plus small indentation at bottom of tank.			
<u>GAZ FOUNTAIN</u>	40,232 (R)	Panama	Naftomar	1969
Dec. 12, 1979 Hit bottom, grounded.	As GAY LUSSAC, Panamanian flag, was surveyed afloat at Marcus Hook, Pa. with respect to grounding. Partloaded Bayway for Philadelphia. Bottom plating at turn of bilge portside in way of nos. 1 and 2 ballast tanks gouged.			
Sept. 1980 Hit bottom, grounded.	As GAY LUSSAC, Panamanian flag, grounding alleged when berthing at Antwerp. Refloated 75 minutes later. Continuous loss of oil from aft simplex seal and continual refilling of oil header tank. Survey to be made during drydocking at St. Nazaire in early January.			
Dec. 1980 Heavy weather damage.	As GAY LUSSAC, Panamanian flag, incurred heavy weather damage enroute from Ras Tanura to Marseilles. Flooding of forecastle space due to tearing away of chain spurling pipe cover. Electric cables, pump motors, fittings, fire-extinguisher system damaged. Temporary repairs effected in Marseilles to enable vessel to continue trading in a seaworthy condition.			
<u>GAZANA</u>	29,791 (R)	British	P & O Steamship	1972
Feb. 1980 Hit by vessel while moving.	Contacted while moored at Montedison berth Porto Marghera by chemical carrier FERTON. Sustained three indents on port side sheerstrake of shell, not affecting seaworthiness. FERTON incurred minor damages. Both vessels deferred repairs.			

VESSEL NAME	CUBIC METERS	FLAG	OWNERS	YEAR BUILT
<u>GEOMITRA</u>	77,731 (I)	British	Shell Tankers	1975
July 1980 Generator damage.	Port diesel generator damaged, en route from Chiba to Lamut. Details unknown. Vessel surveyed in Chiba and sailed July 26 for Yokohama.			
<u>HOEGH SKEAN</u>	52,000 (R)	Norwegian	Leif Hoegh & Co. A/S	1971
Nov. 1980 Hit bottom, grounded	Grounded Shah Allum shoal enroute from Terneuzen to Ras Tanura in ballast. Refloated under own power the same day. Arrived Bahrain Nov. 13 for repairs of 2-3 week duration.			
<u>KATRISA</u>	18,422 (R)	Greek	Tanker Trading Co.	1968
Feb. 1980 Engine damage	Damage to compressor rings nos. 1 and 6 cylinders on main engine while enroute from Leghorn to Skikda. Vessel continued at reduced speed for Leghorn where partial repairs were carried out. Later returned for final repairs.			
<u>LNG LEO</u>	125,000 (I)	American	Patriot Shipping Corp.	1978
July 1980 Hit dock.	While discharging LNG cargo in strong winds at Kobe, damaged pier facilities due to parting of mooring rope. Owners allege shore gangway was broken, two liquid and one vapor return chocks arms extended from normal positions, and pier fenders damaged. No damage reported to vessel.			
<u>LNG LIBRA</u>	125,000 (I)	American	Patriot Shipping Corp.	1979
July 1980 Pump room flooded.	Water damage in forward pump room. Cause and date unknown.			

VESSEL NAME	CUBIC METERS	FLAG	OWNERS	YEAR BUILT
Oct. 1980 Propeller damage.	Propeller shaft moved aft against rudder during loaded voyage from Bontang to Japan. Vessel in tow off Philippines, and arrived Malalag Bay on Oct. 7. LNG was transferred to sister ship LNG LEO over a 32 hour period (Oct. 10-12) using two lines. Vessel sailed Oct. 13 in tow, and arrived Singapore on Oct. 26 where survey revealed fracture of tailshaft.			
<u>LNG TAURUS</u>	125,000 (I)	American	Patriot Shipping Co.	1979
Dec. 1980 Stranded laden off Japan.	Vessel grounded in rough seas off Kitakyushu City on Dec. 12 while en route from Bontang carrying LNG cargo. Refloated four days later by motor tug ZWARTE ZEE and seven harbor tugs. Extensive damage incurred to Nos. 3, 4, 5 and 9 ballast tanks. Vessel arrived in tow at Tobata Dec. 17 to discharge cargo and left same day for drydocking at Nagasaki. Vessel returned to service April 18.			
<u>MUNDOGAS AMERICA</u>	52,647 (R)	Liberian	Mundogas	1972
Feb. 1980 Contact damage.	Survey requested at New York in respect of damage sustained due to contact with tug while docking. Date and place unknown.			
<u>MUNDOGAS EUROPE</u>	22,246 (R)	Liberian	Mundogas	1968
Sept. 1980 Fire in engine room.	Fire in wiping/sludge no. 2 main engine while sailing from Pajaritos to Rio Grande. Repairs effected by local workshop crew, and vessel subsequently arrived at Rio Grande Sept. 19.			
<u>MUNDOGAS PACIFIC</u>	21,795 (R)	Liberian	Mundogas	1969
March 1980 Compressor damage.	Damage to ammonia compressors nos. 5 and 6 due to seawater contamination. Noted in Montevideo. No further details.			

VESSEL NAME	CUBIC METERS	FLAG	OWNERS	YEAR BUILT
May 1980 Engine damage.	Port and starboard generator breakdown on May 17 followed by engine aft turbo-blower stoppage on May 19 enroute from Quintero to Maracaibo. Vessel diverted to Puerto La Cruz on May 21. Set pistons, connecting rods, liners, cylinder covers and bearings were lost on both generators and rotors, bearing and part housing lost on tubor-blower. Sailed May 22 for Italy.			
<u>NORTHERN ARROW</u>	75,610 (R)	Liberian	Northern Nat. Gas.	1978
May 1980 Engine room flooded.	Water flooding no. 3 void space discovered at Dubai where vessel arrived fully-loaded. This was due to ruptured eductor line. Bulkheads port and starboard were distorted, and deck and deckhead ruptured. No. 2 compressor motor was burnt out. Temporary repairs were effected in Dubai, while permanent repairs were deferred until next drydocking.			
<u>OGDEN BRIDGESTONE</u>	74,580 (R)	Panama	Ogden Orinoco	1973
July 1980 Engine damage.	Main engine turning gear damaged. Cause and date unknown. Surveyed at Kobe on July 24.			
<u>PYTHAGORE</u>	14,258 (R)	Panama	Gazocean	1967
Jan. 1980 Hit bottom, grounded.	Ran aground in Aegean after clearing Dardanelles Dec. 28 on loaded voyage from Odessa to U.S. Starboard bottom shell plating, strakes and internals were affected. Repairs completed at St. Nazaire April 8.			

Note: Casualties included in this report were obtained from LLOYD's LIST. Data shown were compiled from this source by Maritime Data Network Ltd. of Stamford, Connecticut, which does not guarantee the accuracy of the information and does not accept responsibility for errors or omissions or their consequences.